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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

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In re Application of
Bao *et al.*

Serial No.: 09/305,722

Filed: May 5, 1999

For: HIGH-RESOLUTION METHOD FOR:
PATTERNING A SUBSTRATE WITH
MICROPRINTING

Group Art Unit: 1746
Examiner: R.P. Gulakowski

**BRIEF OF APPELLANTS FROM
FINAL REJECTION OF JANUARY 27, 2001**

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Applicants Zehnan Bao *et al.* respectfully appeal the Final Rejection mailed February 27, 2001 of their above-identified application.

Real Party in Interest

The real party in interest is Agere Systems Inc., the assignee of applicants' interests in this invention.

Related Appeals and Interferences

There are no other appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

Status of Claims

Applicants appeal the final rejection of claims 1, 3-12, and 19. Claims 13-15 and 20-22 have been withdrawn from consideration as directed to non-elected species. No claims have been allowed. The appealed claims are set forth in an attached Appendix.

Status of Amendments

No amendments after final rejection have been filed.

Summary of the Invention

Applicants' invention is a method of forming a patterned layer on a substrate particularly useful for the fabrication of organic semiconductor devices such as organic transistors. Applicants' specification teaches that conventional methods for patterning semiconductor substrates are inapplicable to the fabrication of organic semiconductor devices (p. 2, line 20 - p. 3, line 10). While micromolding processes have been adapted for the fabrication of organic transistors, these processes are slow, incompatible with efficient reel-to-reel processing and not readily applicable to the formation of dense circuitry (p. 3, lines 11-21).

The specification then teaches that these problems can be overcome by a novel process comprising providing a rotatable stamp with a relief geometry surface, applying ink to the surface, rotating the stamp in contact with a substrate to impress the inked pattern on the

substrate, using the inked pattern to guide etching or depositing material and removing the inked pattern.

Various stages of an exemplary embodiment are illustrated in Figs. 2A through 2D. Fig. 2A shows an inked rotatable stamp 10 rotating over a substrate 14 including a surface layer 16. Fig. 2B illustrates the inked pattern impressed on the substrate surface to protect an underlying region 20, leaving the remaining region 18 of the substrate surface exposed. Fig. 2 shows that the exposed region 18 has been etched away, and Fig. 2D illustrates the ink pattern removed, revealing the unetched protected region. An important advantage of this process is that it permits reel-to-reel fabrication of electronic components as illustrated in Fig.7.

This is essentially the process recited in claim 1. Claims 3-12 and 19 depend on claim 1.

Issues

The issue for resolution is whether claims 1, 3-12 and 19 are unpatentable under 35 U.S.C. §103 in view of the Xia *et al.* publication, "Microcontact Printing With A Cylindrical Rolling Stamp", either alone or in combination with Biebuyck *et al.*, United States Patent No. 5,925,259.

Grouping of Claims

The claims stand or fall together.

Argument

Applicants respectfully submit that neither Xia nor Biebuyck, individually or in combination, make obvious the invention of claim 1. In order for a reference or a combination of references to make obvious a claimed invention, the references must teach or suggest all the claim limitations. See *In re Chu*, 66 F. 3d 292, 36 USPQ 2d 1089, 1094 (Fed. Cir. 1995). And if the references must be modified or combined to make obvious the claimed invention, there must be some teaching or motivation in the references which suggests the modification or combination. See *In re Fritch*, 972 F. 2d 1260, 1266; 23 USPQ 2d 1780 (Fed. Cir. 1992):

The mere fact that the prior art may be modified as suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.

In the present case, Xia *et al.* discloses a microcontact printing process. It is devoid of the claimed step of “removing the inked pattern from the substrate.”

Applicants’ independent claim 1 is directed not to a method of printing but rather to a method of forming a patterned layer. The pattern is formed by printing an inked pattern patterning the surface of the substrate using the inked pattern and removing the inked pattern. The removal step, it was discovered, is needed to enable good connections between the patterned layer and other components. See p. 9, lines 9-10.

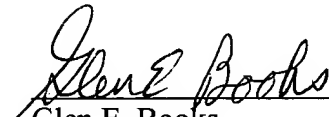
That Xia *et al.* alone does not disclose the removal step is demonstrated by the Examiner’s withdrawal of any assertion that Xia anticipates claim 1. The Examiner expected that the inked pattern would be removed when the substrate is wet etched. But that is not what Xia shows. See Fig. 1 after “Selective wet etching,” showing the printed “SAM” patterns in place.

After withdrawing the Section 102 rejection, the Examiner asserted motivation for such removal in that “such a step would have been found obvious to the skilled artisan, for the purpose of obtaining a clean substrate surface, which will be processed later.” But the Examiner cited no reference for this motivation. Indeed, the only statement of such motivation is the disclosure of the inventors at p. 9, lines 9-10 cited in applicants’ previous amendment. The motivation must come from the reference, not from applicants’ disclosure.

Nor is the deficiency of the Xia *et al.* microprinting process remedied by combining it with Biebuyck. At the outset, Biebuyck has nothing to do with the removal of an inked masking pattern. Biebuyck uses a stamp structure to apply a reactive substance (etchant) or dopant (see col. 3, lines 9-12). Indeed, rather than using an inked masking pattern, Biebuyck teaches that masks should be avoided. (Col. 3, lines 62-64; col. 4, lines 5-9). Thus neither Xia nor Biebuyck teaches or suggests patterning using a removable ink masking pattern, and Biebuyck teaches away from the use of any mask. Accordingly claim 1 and its dependent claims patentably distinguish from Xia and Biebuyck.

In view of the foregoing, the final rejection of claims 1, 3-12 and 19 is incorrect and should be REVERSED.

Respectfully submitted,


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APPENDIX

What is claimed:

1. A method for forming at least one patterned layer on a substrate comprising the steps of:
 - providing a rotatable stamp having relief geometries on its surface to define a stamping surface;
 - applying ink to the surface of the rotatable stamp to define an inked stamping surface;
 - rotating the rotatable stamp as the substrate is placed in contact with the stamp to impress an inked pattern on the substrate as defined by the inked stamping surface; and
 - patterning the substrate by etching material from or depositing material on the substrate, wherein the inked stamping surface guides the etching or depositing of material in a geometry to define the patterned layer useful in fabricating an electronic device; and
 - removing the inked pattern from the substrate.

3. The method of claim 1, in which the step of providing the rotatable stamp comprises:
 - (a) casting a liquid onto a surface having relief geometries thereon;
 - (b) solidifying the liquid to define a solid film; and
 - (c) rolling a member over the solid film so that the solid film is lifted from the surface and bonds to the member.

4. The method of claim 3, in which the liquid comprises an elastomeric material, the step of solidifying the liquid comprises curing the elastomeric material to form an elastomeric film.

5. The method of claim 4, further comprising a step of exposing the cured elastomeric film to oxygen plasma before the member is rolled over the film.

6. The method of claim 1 in which the substrate is a multi-layered film including at least one coating layer.

7. The method of claim 6 in which the at least one coating layer includes a thin layer of gold or silver.

8. The method of claim 1 in which the step of patterning the substrate comprises etching material from the substrate applying an etchant selected from the group consisting of aqueous ferrocyanide, $K_4Fe(CN)_6$, $K_3Fe(CN)_6$, $Na_2S_2O_3$, and KOH in H_2O .

9. The method of claim 1, in which the step of rotating the stamp provides an exposed region on the substrate where substantially no ink is present and a protected region on the substrate where ink substantially covers the substrate, and the step of patterning the substrate comprises etching material from the substrate at the exposed region or depositing of material on the substrate at the exposed region.

10. The method of claim 9 in which the substrate is a multi-layered film including a metallic layer and the step of patterning the substrate comprises etching the metallic layer from the substrate at the exposed region.

11. The method of claim 10, in which the substrate further has an adhesive layer applied to the metallic layer selected from the group consisting of Ti and Cr.

12. The method of claim 1 in which the mechanism applies ultraviolet light, heat, or wet chemical means to the substrate to remove the inked pattern.

19. The method of claim 3 wherein the member comprises a cylinder with a glass surface.